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(54) Bleaching compositions.

(57) Aqueous hypochlorite bleach compositions are provided comprising from 0.1% to 5.0% of a C<sub>10</sub>-C<sub>18</sub> alkyl C<sub>1</sub>-C<sub>4</sub> alkyl diamine oxide or a C<sub>1</sub>-C<sub>18</sub> alkyl substituted betaine together with from 0.001% to 0.25% of an organosilicon quaternary ammonium compound containing a C<sub>1</sub>-C<sub>20</sub> alkyl group wherein the ionic strength of the compositions is less than 5.0 g moles/dm<sup>3</sup>.

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BLEACHING COMPOSITIONS

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Field of the Invention

5        This invention relates to hypochlorite bleach compositions and in particular to aqueous hypochlorite bleaches containing a bactericidal material.

Background to the Invention

10        Aqueous bleach compositions containing alkali metal hypohalites, particularly sodium hypochlorite, have been known for many years. Because of their powerful oxidising action they have also been acknowledged to be powerful germicides and have been used extensively where this property is beneficial, e.g. in the cleaning of baths, wash basins, flush toilets, drains and  
15        ceramic tile floors. However, it has long been recognised that the germicidal effectiveness of surface treatments using such materials is limited by the relatively short period of time during which the aqueous composition containing the hypohalite is in contact with the surface concerned. Recent developments  
20        in the formulation of hypochlorite bleach products have shown a trend towards the use of higher viscosities, viz. 100 centistokes or greater, and this will increase the retention of such products on non horizontal surfaces.

25        Nevertheless, the increase in retention time introduced by such a thickened formulation will not be particularly significant, being measured in seconds or at most minutes, and a need exists for a bactericidal and germicidal material that is capable of retention on a target surface for much longer periods.

Quaternary ammonium compounds, in general, are known to have bactericidal characteristics, and certain water soluble quaternary ammonium surfactants such as cetyl pyridinium bromide are very effective antibacterial agents. Polymeric dialkyl siloxane and silane structures are well known as having a high affinity for siliceous surfaces and thus a combination of a quaternary ammonium function and a siloxane or silane grouping might be expected to provide a long lasting antibacterial effect on siliceous surfaces of the type mentioned above. Such is indeed the case and the antimicrobial effectiveness of a representative alkoxy silane (3(trimethoxy silyl) propyl dimethyl octadecyl ammonium chloride) on a variety of surfaces, siliceous, metallic, synthetic, plastic and natural textile in nature, has been reported by A J Isquith et al in J. Applied Microbiology, 24 (6), 1972, pp 859-863.

However, the incorporation of quaternised alkoxy silanes into aqueous cleaning or bleaching compositions poses considerable difficulty. All alkoxy silanes of this type will hydrolyse in contact with water, to produce the corresponding silanol derivatives which themselves are prone to polymerisation via condensation of the silanol groups. The polymerised materials are less surface substantive than the parent silanols.

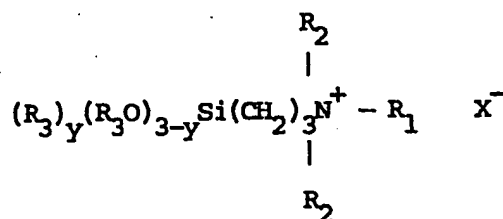
In the case of the more water soluble alkoxy silanes, containing a  $C_{12}$ - $C_{14}$  alkyl group in the quaternary ammonium portion of the molecule; the materials display physical stability in aqueous alkalis and commercial aqueous hypochlorite and also display surface substantive properties. However, in the presence of hypochlorite-stable surfactants, surface substantivity is markedly impaired due to solubilisation into surfactant micelles. Furthermore, these shorter chain alkyl quaternised alkoxy silanes do not display broad range antibacterial efficacy.

Quaternary alkoxy silanes containing an alkyl chain longer than  $C_{14}$  are less water soluble and do not even display long term stability in aqueous alkaline solutions but precipitate therefrom, probably in polymerised, and hence  
 5 antibacterially ineffective, form.

However, it has surprisingly been found that those quaternised alkoxy silanes containing a  $C_{16}$ - $C_{20}$  alkyl group can be incorporated into certain aqueous hypochlorite bleach compositions to produce a physically stable product  
 10 capable of delivering hydrophobic properties and a long lasting antibacterial effect to siliceous surfaces treated therewith.

Aqueous hypochlorite bleach compositions forming suitable vehicles for the delivery of the quaternised alkoxy silanes  
 15 should be free or substantially free of anionic surfactants and preferably should have a low ionic strength.

Accordingly the present invention provides an aqueous bleaching composition comprising from 0.1%-5% by weight of a surfactant selected from amine oxides of formula  
 20  $R_4R_5R_6N \rightarrow O$ , wherein  $R_4$  is a  $C_{10}$ - $C_{18}$  alkyl group and  $R_5$  and  $R_6$  are  $C_1$ - $C_4$  alkyl groups, substituted betaines of formula  $R_7R_8R_9N^+-R_{10}COO^-$  wherein  $R_7$  is a  $C_8$ - $C_{18}$  alkyl group and  $R_8$ , and  $R_9$  are  $C_1$ - $C_4$  alkyl groups, and  $R_{10}$  is a  $C_1$ - $C_4$  alkylene  
 25 group and mixtures thereof, from 1.0% to 12.0% by weight of an alkali metal hypochlorite and from 1.0% to 15% by weight of inorganic compounds other than hypochlorite, said composition having a pH in the range from 10 to 13, wherein the composition also contains from 0.001-0.25% by weight of  
 30 an organosilicon quaternary ammonium compound of formula



wherein  $R_1$  is  $C_{16}$ - $C_{20}$  alkyl,  $R_2$  is  $C_1$ - $C_4$  alkyl,  $R_3$  is  $C_1$ - $C_4$  alkyl,  $y$  is an integer from 0 to 2, and  $X^-$  is a water soluble anion or the silanol derivative thereof wherein  $R_3$  is H;

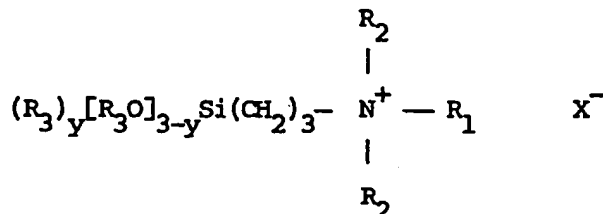
- 5 wherein the ionic strength of the composition is less than  $5.0 \text{ g moles/dm}^3$  and wherein the composition is substantially free of anionic surfactant species.

Preferably the composition contains from 0.005% to 0.05% and most preferably from 0.01% to 0.03% of the organosilicon  
10 quaternary ammonium compound. Preferably  $R_1$  is a  $C_{18}$  alkyl group.

- In highly preferred compositions in accordance with the invention, the viscosity of the composition is at least 200 centipoises at  $20^\circ\text{C}$  and comprises alkali metal hypochlorite  
15 in an amount of from 8% to 10% by weight, a  $C_{14}$ - $C_{15}$  alkyl dimethyl amine oxide as the only surfactant in an amount of from 1.0 to 1.5% by weight together with at least 400ppm of a secondary or tertiary alcohol as hereinafter defined or the ester thereof with a  $C_2$ - $C_3$  alkanolic acid, and the  
20 composition has an ionic strength of less than  $4.0 \text{ g moles/dm}^3$ .

- The above mentioned reference to viscosity is to the dynamic viscosity  $\eta$  which is measured by a Brookfield RVT viscometer and for the purposes of this specification  
25 measurements are made with Spindle No. 3 at 100 rpm and a liquid temperature of  $20^\circ\text{C}$ . Fluid viscosity can also be expressed as the kinematic viscosity  $\nu$  in centistokes as measured by an Ostwald viscometer and is characterised by the expression  $\nu = \eta/\rho$  where  $\eta$  is the dynamic viscosity in centipoises and  $\rho$  is the density in  $\text{g/cm}^3$ . Compositions in  
30 accordance with the present invention have a density in the range from 1.10 to  $1.25 \text{ g/cm}^3$ , typically approximately  $1.15 \text{ g/cm}^3$ , so that the numerical value of the kinematic viscosity in centistokes is slightly less than that of the  
35 dynamic viscosity in centipoises.

Organosilicon quaternary ammonium compounds having the desired combination of broad spectrum antibacterial activity and physico chemical stability in compositions in accordance with the invention have the general structure:



5 wherein  $R_1$  is  $C_{16}$ - $C_{20}$  alkyl,  $R_2$  is  $C_1$ - $C_4$  alkyl,  $R_3$  is  $C_1$ - $C_4$  alkyl,  $y$  is an integer from 0 to 2, and  $X^-$  is a water soluble anion. A preferred chain length for  $R_1$  is  $C_{18}$  for antibacterial efficacy reasons, and for reasons of cost and ease of preparation  $R_2$  and  $R_3$  are usually methyl. In  
10 aqueous alkaline solution the  $(R_3O)$  groups will hydrolyse to give the silanol derivative or, depending on the pH, the corresponding zwitterion, so that references herein to the organic silicon quaternary ammonium compound include the silanol derivative thereof.  $X^-$  is normally halide, particularly  
15 chloride, but can also include methosulphate, acetate or phosphate.

The level of incorporation of the organosilicon compound is from 0.001% to 0.25% based on the total weight of the composition but is more usually in the range of from 0.005% to  
20 0.05% and most preferably from 0.01% to 0.03% by weight.

In compositions in accordance with the invention, the hypochlorite bleach, and the alkali metal chloride and chlorate salts which accompany it in commercially available material, provide the majority and preferably substantially all of the  
25 ionic strength requirement. This will normally result in an ionic strength of at least 3.0 g moles/dm<sup>3</sup>. Ionic strength values in excess of 5.0 g moles/dm<sup>3</sup> are not desirable because of their adverse influence on the stability of both the hypochlorite and organosilicon quaternary

ammonium compound components. Preferably the ionic strength is less than  $4.0 \text{ g moles/dm}^3$  and values in the region of  $3.4\text{--}3.8 \text{ g moles/dm}^3$  are considered to be optimum where a stable product of viscosity  $\geq 200$  centipoises is desired.

- 5       The alkali metal hypochlorite may be a lithium, potassium or sodium hypochlorite and the level of hypochlorite in the composition is normally arranged to lie in the range 1-12%, preferably 5-10% by weight. Customarily hypochlorite bleach compositions contain approximately 6% or 9% hypochlorite by weight. However, the activity of chlorine bleaching compositions is conventionally expressed in terms of the weight percentage of available chlorine in the composition, and the actual weight percentage of bleaching species is arranged to provide the desired level of 'available chlorine'. The preferred hypochlorite species is sodium hypochlorite which contains 95.3% available chlorine.
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- Alkali metal hypochlorites are commercially available as aqueous solutions containing 10-15% by weight 'available chlorine' and the bulk suppliers normally produce material having available chlorine contents towards the upper end of this range viz. 12-14% by weight. These commercially available hypochlorite solutions contain other salts as byproducts or contaminants, more specifically free alkalinity in the form of alkali metal hydroxide and alkali metal carbonate, and alkali metal chloride. Low levels of other species such as sodium chlorate are also believed to be formed during hypochlorite manufacture but their chemical stability is sufficiently low that they have largely decomposed by the time the hypochlorite is employed in product formulations. The levels of the byproduct materials depend on the processing conditions employed in the
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manufacture of the hypochlorite but in general they fall within the ranges

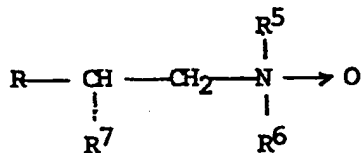
- 0.2 - 1.0% alkali metal hydroxide
- 0.01 - 0.1% alkali metal carbonate
- 5 10.0 - 18.0% alkali metal chloride

expressed as a weight percentage of the hypochlorite solution as supplied.

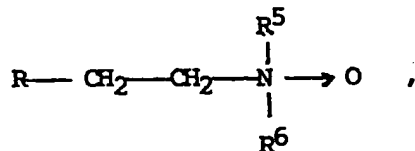
Amine oxides useful in the present invention have the formula  $R_4R_5R_6N \rightarrow O$  wherein  $R_4$  is a  $C_{10}-C_{18}$  alkyl group and  $R_5$  and  $R_6$  are  $C_1-C_4$  alkyl groups. The amine oxide is present in an amount of from 0.5% to 5%, more preferably from 0.5% to 2.5% and, in preferred embodiments of the invention in which the  $R_4$  average chain length  $\approx 14$  carbon atoms, from 1% to 1.5% by weight of the composition. The  $R_4$  group may be linear or branched and may be derived from natural or synthetic hydrocarbon sources. For the purposes of the present invention linear groups are defined as including moieties incorporating up to 25% methyl branching, predominantly in the 2-position relative to the nitrogen atom of the amine oxide.

Methyl branching on the alkyl chain also predominates in those amine oxides useful in the present invention in which the  $R_4$  group is branched, rather than linear in nature.

Commercially available sources of these amine oxides are normally a mixture of



where  $R^7$  is methyl, and



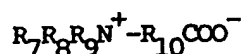


which mixture arises as a result of the processing route used to form the precursor alcohol or aldehyde. This route involves carbonylating or hydroformylating an olefin, preferably a linear  $\alpha$ -olefin and leads to a mixture of the desired branched chain aldehyde or alcohol of the same carbon number. For olefin starting materials having a range of carbon chain length, the resultant alcohol or aldehyde mixture contains compounds of different carbon number and isomers containing straight chain and 2-alkyl branched chain alkyl groups. A typical commercially available mixture comprises 65 to 75% by weight  $C_{13}$  and 35 to 25% by weight  $C_{15}$  amine oxides with approximately 50% by weight straight chain and 50% by weight 2-alkyl branched chain where the 2-alkyl group is predominantly methyl. These are available from ICI under the trade name Synprolam 35 DMO as a 30% aqueous solution. The branched chain amine oxides and mixtures thereof with linear chain amine oxides are used at levels towards the upper end of the range viz.  $\geq 2\%$  by weight of the composition and typically from 2.0% to 2.5% by weight.

Although the above-described mixture of straight chain and branched chain alkyl dimethyl amine oxides has been found suitable for the purposes of the invention, their use does not constitute the most preferred execution of the invention. This is because a bleaching composition containing 8-10% hypochlorite and an amine oxide in which the long chain alkyl group has a carbon number of about 13.3 requires an ionic strength of at least 4.7 g moles/dm<sup>3</sup> to achieve the preferred product viscosity of at least 200 cp. This level of ionic strength is believed to make the storage stability of the hypochlorite bleach less than that which is considered desirable for the expected shelf life of the product. The preferred amine oxide structure for 'thickened' products having a viscosity of  $\geq 200$  cp is one in which  $R_4$  is a linear group which has an average chain length in the

range C<sub>14</sub>-C<sub>15</sub>. Compositions containing these preferred amine oxides require a lower amine oxide level viz. <2.0%, more typically 1.0-1.5% and also a lower ionic strength viz. 3:0 g moles/dm<sup>3</sup> minimum in order to achieve target viscosity. Both of these reductions in ingredient level lead to improved storage stability and also lower the cost of the product.

Another hypochlorite-stable surfactant suitable for the purposes of the present invention is a substituted betaine of formula



wherein R<sub>7</sub> is a C<sub>8</sub>-C<sub>18</sub> alkyl group, preferably a C<sub>10</sub>-C<sub>14</sub> alkyl group, R<sub>8</sub> and R<sub>9</sub> are C<sub>1</sub>-C<sub>4</sub> alkyl groups, more preferably methyl groups, and R<sub>10</sub> is a C<sub>1</sub>-C<sub>4</sub> alkylene group more preferably a C<sub>2</sub>-C<sub>3</sub> alkylene group. Specific examples include octyl, decyl, dodecyl, tetradecyl and hexadecyl betaines in which R<sub>10</sub> is an ethylene or propylene group and R<sub>8</sub> and R<sub>9</sub> are methyl groups.

Mixtures of hypochlorite-stable surfactants are also known in the art particularly where it is desired to increase the viscosity of the system and examples of other hypochlorite-stable surfactants include saturated fatty acid soaps, alkyl sulphates, alkane sulphonates, sarcosinates and taurides. These surfactants which are anionic in type should be employed at levels which do not interfere with the efficacy of the quaternised alkoxy silane. Because of the tendency of cationic and anionic surfactant species to react to form high molecular weight, relatively water-insoluble complexes, anionic surfactants should be present at less than the amount necessary to complex the quaternised alkoxy silane completely. It has been found that quaternised alkoxy silane deposited on a siliceous surface from compositions in accordance with the invention provides 80% to 90% reduction in

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bacteria (E. Coli) count on exposed surfaces when the treated surfaces are subsequently exposed to an inoculum of fresh bacteria in a distilled water environment. However the presence in the composition of anionic surfactants in excess  
5 of the amount necessary to complex the quaternised alkoxy silane leads to a significant diminution of the bacteria count reduction under the same conditions.

Accordingly, the composition should be substantially free of anionic surfactants, substantially free being defined as  
10 less than the amount of surfactant necessary to completely complex the quaternised alkoxy silane, and preferably should be completely free of such surfactants.

A highly preferred optional component for hypochlorite bleach compositions suitable for incorporating the  
15 quaternised alkoxy silanes, particularly those utilising from 1.0 to 2.0% of an amine oxide wherein  $R_1$  has an average chain length of about 14 carbon atoms, is at least 400 ppm based on the weight of the composition, of at least one secondary or tertiary alcohol selected from cedrol, tetra  
20 hydro linalool, tetra hydro muguol (a 50:50 mixture of tetra hydro linalool and a positional isomer, tetra hydromyrcenol), verdol, dihydro terpeneol, isoborneol, 4-tertiary butyl cyclo hexanol and menthol and mixtures of any of these or of their hydrolysable  $C_2-C_3$  carboxylic acid esters. These  
25 alcohols and their  $C_2-C_3$  alkanolic acid esters are known and used as ingredients in fragrances, including those employed in detergent compositions. As such their level of incorporation conventionally lies between 10 ppm and 600 ppm of the composition depending on the perfume formulation and  
30 the nature of the detergent composition.

It has now surprisingly been found that in aqueous hypochlorite bleach solutions containing from 1.0% to 2.0% of a  $C_{14}-C_{16}$  amine oxide as the only surfactant, the incorporation of at least one of the above mentioned

secondary or tertiary alcohols or an ester thereof with  $C_2-C_3$  alkanolic acid provides an enhancement of the viscosity of the bleach solution and facilitates the generation of viscosities of 200 centipoises and greater at 20°C. Preferably the secondary or tertiary alcohol or ester is present in an amount of more than 600 ppm and, where the amine oxide level is  $\leq 1.5\%$  by weight is more preferably present in an amount of at least 800 ppm. Advantageously a mixture of the alcohols or their  $C_2-C_3$  alkanolic acid esters is used in a total amount of from 600 to 1600 ppm although it is preferred that one of the components of the mixture should be present in an amount of at least 500 ppm by weight of the composition.

The most preferred materials are cedrol, tetrahydro linalool, tetrahydro myrcenol and dihydro terpineol and their acetate esters. These materials have tertiary alcohol functionality and are relatively immune to breakdown in hypochlorite-containing solutions, resulting in viscosity-enhancement effects which are stable with time.

The mode of operation of these materials in this system is not fully understood but it is hypothesised that in the absence of anionic surfactants, hydrogen bonding occurs between adjacent alcohol functions of the relatively water insoluble alcohols held in the amine oxide micelles. This is believed to lead to the formation of an extended micellar structure in the solution which provides an increased viscosity. The maximum viscosity of the system is not reached immediately upon mixing, but develops over a period of time and accordingly viscosity is measured 24 hours after the product has been made.

Thickened aqueous hypochlorite bleach compositions including the above mentioned alcohol derivatives are particularly preferred for the incorporation of the quaternised alkoxy silane antibacterial component as such compositions utilise the minimum

amounts of amine oxide surfactant and ionic salts necessary to generate the desired product viscosity and hence enhance the stability of the quaternised alkoxy silanes.

5 As stated hereinbefore, the salts accompanying the hypochlorite bleach provide most if not all of the ionisable species necessary for the ionic strength requirement. However, other non surface active organic or inorganic compounds can be added where necessary to provide an ionic strength in the desired range.

10 The ionisable compound(s) can be inorganic in nature eg. hydroxide, sulphate, halide, (particularly chloride), carbonate, nitrate, or orthophosphate, pyrophosphate, or polyphosphate, or organic such as formate, acetate or succinate.

15 In the preferred embodiments of the invention inorganic compounds such as silicates and organic compounds incorporating oxidisable groups are avoided because of their tendency to have adverse effects on physical and/or chemical stability of the compositions on storage. Certain organic sequestrants such as the amino poly (alkylene phosphonates) salts can, however, be incorporated in an oxidised form in which they are not susceptible to attack by the hypochlorite bleach. Such sequestrants are normally present in amounts of from 0.1% to 0.5% by weight of the composition.

20 The ionic strength of the composition is calculated by means of the expression

25 Total Ionic Strength  $I = \sum \frac{C_i Z_i^2}{2}$

where  $C_i$  is the molar concentration of the ionic species in g moles/dm<sup>3</sup>

$Z_i$  is the valency of the species.

30 The function  $C_i Z_i^2$  is calculated for each of the ionic species in solution, these functions are summed and divided by two to give the composition ionic strength.

The ionisable alkali metal compound normally comprises a caustic alkali such as sodium or potassium hydroxide either alone or in admixture with alkali metal salts. This gives a composition pH (as is) of 10 to 13, although in-use the pH of the bleaching solution normally has a value in the range from 11 to 12.

For product safety reasons the amount of caustic alkali is normally limited to a value in the range of from 0.5% to 2%, more usually from 0.75% to 1.5% by weight of the composition.

A desirable optional component of compositions in accordance with the invention is a perfume which is present at a level of from 0.01% to 0.5% preferably from 0.05% to 0.25% by weight of the composition. In the preferred thickened bleach compositions incorporating one or more of the above described secondary or tertiary alcohol components the alcohol component(s) can conveniently be incorporated in the perfume mixture.

A further desirable optional component in compositions in accordance with the invention is an agent for siliceous glaze protection such as zinc oxide, or aluminium oxide and water soluble bismuth salts. This can be added in an amount of from 0.01% to 0.1% by weight of the composition more preferably from 0.02% to 0.06% by weight.

The compositions are made by conventional mixing techniques. Because of the relatively low aqueous solubility of the organo silicon compound which is normally supplied as a solution in methanol, a premix of the amine oxide, perfume, added caustic alkali and water is normally prepared and the organo silicon compound is then added with vigorous agitation.

This mixture is then added to the hypochlorite solution to make the final product. Other orders of addition can be used but unless the amine oxide is present in the solution to which the organo silicon compound solution is added, problems of incomplete solution or precipitation can arise.

The invention is illustrated in the following examples in which percentages are expressed by weight of the composition unless otherwise stated.

In the Examples, reference to ingredients have been abbreviated as follows:

5	C <sub>15</sub> DMAO	C <sub>15</sub> alkyl dimethyl amine oxide in which the alkyl group is 95% C <sub>15</sub> and approximately 50% of the alkyl groups contain methyl branching on the 2-carbon atom.
10	C <sub>14</sub> DMAO	C <sub>14</sub> alkyl dimethyl amine oxide in which the alkyl group is a predominantly linear C <sub>14</sub> ( 94%) moiety. Available from Albright & Wilson Ltd as Empigen OH.
	NaCl	Sodium chloride
	NaOH	Sodium hydroxide
15	NaOCl	Sodium hypochlorite

#### EXAMPLE 1

420g of a 30% solution of C<sub>14</sub> alkyl dimethyl amine oxide was added to 3555.6 g of demineralised water and 12.5 g of a perfume material containing 6.4g of isobornyl acetate. 20 was dispersed therein. To this solution was slowly added, with vigorous agitation, 11.9 g of a 42% solution in methanol of 3(trimethoxy silyl) propyl dimethyl octadecyl ammonium chloride (available from Dow Corning Ltd as DC 5700) to form a premix solution. 125 g of solid sodium hydroxide was 25 dissolved in 5875 g of sodium hypochlorite solution (15.3% AvCl<sub>2</sub> solution supplied by ICI Ltd) and 4000 g of the premix was then blended with high shear agitation into this solution.

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This composition had the following analysis, in percent by weight and had a density of  $1.15 \text{ g/cm}^3$ .

	NaOCl	9.43 (= 9.0% available chlorine)	1.46 g moles/dm <sup>3</sup>
	NaCl	9.40	1.84 " " "
5	NaOH	1.25	0.36 " " "
	Amine		
	Oxide	1.26	
	DC5700	0.05	
	Perfume	0.125	
10	Water &		
	Misc	78.485	
	<hr/>		
		100.000	

This product was a single phase solution having a dynamic viscosity of 270 centipoises as measured at 20°C with a Brookfield viscometer using the No. 3 spindle at 100 rpm on product that was 24 hours old.

The ionic strength of this composition was calculated to be 3.66.

#### EXAMPLE 2

The following compositions are prepared according to the technique of Example 1:

	(a)	(b)	(c)	(d)
		1.2	1.5	1.75
	C <sub>14</sub> DMAO			
	C <sub>15</sub> DMAO	1.2		
25	DC5700	0.02	0.02	0.02
	NaOH	1.0	1.0	1.0
	NaOCl	9.0	9.0	9.0
	NaCl	9.0	9.0	9.0
	Isoborneol	0.05	0.06	0.04
30	Dihydroterpinyl	0.06		
	acetate			
	Water & Misc.	<hr/> to 100 <hr/>		
	Viscosity (cp)	350	190	245
				324



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The density of each of these compositions is 1.15 g/ml and the ionic strength for each composition is calculated to be 3.5 g moles/dm<sup>3</sup>. The product viscosity was measured at 20°C using the technique of Example 1.

5 EXAMPLE 3

The following compositions were prepared according to the technique of Example 1. The alcohol and ester levels are given in ppm.

		(a)	(b)	(c)	(d)
10	C <sub>14</sub> DMAO	1.26	1.26	1.26	1.26
	DC5700	0.02	0.02	0.02	0.02
	NaOH	1.0	1.0	1.0	1.0
	NaOCl	9.0	9.0	9.0	9.0
	NaCl	9.0	9.0	9.0	9.0
15	Cedrol	733			733
	Tetrahydrolinalool		517		
	Verdol			511	
	Dihydro terpinyl acetate				647
20	Isobornyl Acetate	641		641	
	4 Tertiary butyl cyclohexyl acetate			450	
	Isobornyl propionate		687		
	Menthyl acetate		290		
25	Water	_____ to 100 _____			

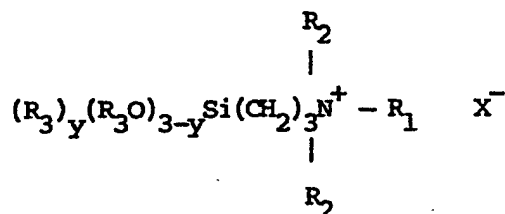
Brookfield viscosity measurements in centipoises were made after 24 and 72 hours and were as follows:

	(a)	(b)	(c)	(d)
24 hours	295	190	70*	240
5 72 hours	295	215	355	255

\*The solution was cloudy and appeared to display non homogeneity. This disappeared after further storage.

CLAIMS

1. An aqueous bleaching composition consisting essentially of from 0.1%-5% by weight of a surfactant selected from amine oxides of formula  $R_4R_5R_6N \rightarrow O$ , wherein  $R_4$  is a
- 5  $C_{10}-C_{18}$  alkyl group and  $R_5$  and  $R_6$  are  $C_1-C_4$  alkyl groups, substituted betaines of formula  $R_7R_8R_9N^+-R_{10}COO^-$  wherein  $R_7$  is a  $C_8-C_{18}$  alkyl group and  $R_8$ , and  $R_9$  are  $C_1-C_4$  alkyl groups, and  $R_{10}$  is a  $C_1-C_4$  alkylene group and mixtures thereof,
- 10 from 1.0% to 12.0% by weight of an alkali metal hypochlorite and from 1.0% to 15% by weight of inorganic compounds other than hypochlorite, said composition having a pH in the range from 10 to 13, characterised in that the composition also contains from 0.001-0.25% by weight of an organosilicon
- 15 quaternary ammonium compound of formula



- wherein  $R_1$  is  $C_{16}-C_{20}$  alkyl,  $R_2$  is  $C_1-C_4$  alkyl,  $R_3$  is  $C_1-C_4$  alkyl  $y$  is an integer from 0 to 2 and  $X^-$  is a water soluble anion; or the silanol derivative thereof wherein  $R_3$  is H;
- 20 wherein the ionic strength of the composition is less than  $5.0 \text{ g moles/dm}^3$  and wherein the composition is substantially free of anionic surfactant species.
2. A bleaching composition according to Claim 1 wherein  $R_1$  is  $C_{18}$  and  $X^-$  is a halide anion.
- 25 3. A bleaching composition according to either one of Claims 1 and 2 wherein the ionic strength of the composition is less than  $4.0 \text{ g moles/dm}^3$ .

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4. A bleaching composition according to any one of Claims 1-3 wherein an alkyl dimethyl amine oxide, in which the alkyl group is linear and has an average carbon chain length of from 14 to 15 carbon atoms, is the only surfactant species present.
5. A bleaching composition according to claim 4 wherein the amine oxide comprises from 1.0% to 2.0% by weight of the composition.
6. A bleaching composition according to claim 5 further incorporating from 0.01% to 0.1% by weight of a glaze protection agent selected from zinc oxide aluminium oxide and water soluble bismuth salts.
7. A thickened bleaching composition according to either one of claims 5 and 6 wherein the composition incorporates at least 400ppm, by weight, of a compound selected from cedrol, tetrahydro linacool, tetra hydro myrcenol, verdol, dihydro terpeneol, isoborneol, 4- tertiary butyl cyclo hexanol and menthol, the hydrolysable  $C_2-C_3$  carboxylic acid esters of any of the foregoing, and mixtures of any thereof, whereby the composition has a viscosity of 200 centipoises at 20°C.
8. A thickened bleaching composition according to claim 7 wherein the amine oxide level is from 1.0% to 1.5% and the compound is present in an amount of at least 600 ppm.
9. A thickened bleach composition according to claims 7-8 wherein a mixture of alcohols and/or  $C_2-C_3$  alkanolic acid esters thereof is present in a total amount of from 600 ppm to 1600 ppm.

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10. A thickened bleach composition according to claims 7-9  
wherein the compound is selected from cedrol, tetrahydro  
linacool, tetra hydro myrcenol or dihydro terpineol, the  
C<sub>2</sub>-C<sub>3</sub> alcanoic acid esters of any of the foregoing and  
5 mixtures thereof.